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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/587,266	07/26/2006	Tadahiro Ohmi	427-109	4778
23117 7590 08/11/2009 NIXON & VANDERHYE, PC 901 NORTH GLEBE ROAD, 11TH FLOOR ARLINGTON, VA 22203				
EXAMINER				
NGUYEN, COLETTE B				
ART UNIT		PAPER NUMBER		
1793				
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08/11/2009		PAPER		

**Please find below and/or attached an Office communication concerning this application or proceeding.**

The time period for reply, if any, is set in the attached communication.

### Office Action Summary

**Application No.**

10/587,266

**Applicant(s)**

OHMI ET AL.

**Examiner**

COLETTE NGUYEN

**Art Unit**

1793

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --  
**Period for Reply**

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

**Status**

- 1) ☒ Responsive to communication(s) filed on 20 July 2009.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

**Disposition of Claims**

- 4) ☒ Claim(s) 1,2,4 to 12 is/are pending in the application.
- 4a) Of the above claim(s) \_\_\_\_\_ is/are withdrawn from consideration.
- 5) ☐ Claim(s) \_\_\_\_\_ is/are allowed.
- 6) ☒ Claim(s) 1,2,4 to 12 is/are rejected.
- 7) ☐ Claim(s) \_\_\_\_\_ is/are objected to.
- 8) ☐ Claim(s) \_\_\_\_\_ are subject to restriction and/or election requirement.

**Application Papers**

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on \_\_\_\_\_ is/are: a) ☒ accepted or b) ☐ objected to by the Examiner.
- Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
- Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

**Priority under 35 U.S.C. § 119**

- 12) ☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☒ All b) ☐ Some \* c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
  2. ☐ Certified copies of the priority documents have been received in Application No. \_\_\_\_\_.
  3. ☒ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

\* See the attached detailed Office action for a list of the certified copies not received.

**Attachment(s)**

- 1) ☒ Notice of References Cited (PTO-892)
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
- 3) ☐ Information Disclosure Statement(s) (PTO/CDC)
- 4) ☐ Interview Summary (PTO-413)
- 5) ☐ Notice of Informal Patent Application
- 6) ☐ Other: \_\_\_\_\_
- Paper No(s)/Mail Date \_\_\_\_\_

## **DETAILED ACTION**

### ***Continued Examination Under 37 CFR 1.114***

1. A request for continued examination under 37 CFR 1.114, including the fee set forth in 37 CFR 1.17(e), was filed in this application after final rejection. Since this application is eligible for continued examination under 37 CFR 1.114, and the fee set forth in 37 CFR 1.17(e) has been timely paid, the finality of the previous Office action has been withdrawn pursuant to 37 CFR 1.114. Applicant's submission filed on 06/26/09 has been entered.

### ***Status of the application***

*Claim 3 canceled. Claim 12 new. Claims 1 and 8 amended. Claims 1-2 and 4-12 are presented here for examination*

### ***Claim Rejections - 35 USC § 103***

1. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

2. **Claims 1-2 and 4-12** are rejected under 35 U.S.C. 103(a) as being unpatentable over Rostaing et al. (5,993,612) in view of Breitbarth et al. (DE4319118).
3. **Regarding claim 1:** Rostaing discloses a gas treatment method and apparatus for purifying an exhaust gas, in particular a plasmagenic rare gas, such as krypton and xenon containing tetrafluoro methane (CF<sub>4</sub>), a halide gas. Rostaing teaches that as the gas exits the production equipment, it flows through a high frequency field applicator device 10 (col 4, ln 41- 68 and fig 1 and 2) for the purpose of excite the gas before reaching the hollow dielectric tube (an excitation unit) , creating an electric field in the gas by means of a traveling electromagnetic wave (surfatron guide type) which creates a column of low pressure plasma which is not in local thermodynamic equilibrium (LTE) for the purpose of dissociating the impurities in the gas in order to form reactive compounds, then making the formed reactive compounds react with a corresponding reactive element (a reaction remover) for the purpose of eliminating them from the gas to be purified. The system also includes a soda lime (Calcium hydroxides) and a humidifier. (Col 3, ln 25). He does not specify the operating pressure of the system; he only mentions the plasma that the system is created is an atmospheric plasma. Breitbarth teaches process and apparatus for disposing of fluorocarbon containing compounds by conversion of these compounds in a plasma-chemical process in which the said compound are converted in the plasma with a solid with addition of oxygen, steam or hydrogen. The apparatus used is a low pressure plasma reactor which contains the solid and can be operated with a high

frequency, low frequency, direct current or microwave discharge (abstract) at a pressure of 0.01 to 50 mbar, which is 37 torr (Breitbarth, page 2, ln 26 of the translation). Both do not specify that the flow is viscous, however the created plasma travels in column form and as steam is introduced as taught by Breitbarth and furthermore, Rostaing points out that *"to increase the efficiency of the removal of the impurities, it is necessary that the flowing gas is put in contact with water so that this gas becomes laden with vapor"*, which obviously makes the gas saturated and viscous. (Rostaing, Col 11, ln 25). As both teach gas purification using plasma, it would have been obvious for one of ordinary skill in the art at the time of the invention to combine the teachings of Breitbarth of operating pressure of 37 torr, which is slightly on the vacuum or negative pressure to pull the exhaust gas to the system, with the teaching of Rostaing of the method and apparatus to improve the process of purifying perfluorinated gases to achieve savings by minimizing equipment such as piping and by speeding up the process for a further effective method of gas purification.

4. Regarding claim 8, Rostaing discloses a process and apparatus for purifying a gas, in particular a plasmagenic rare gas, such as krypton and xenon containing tetrafluoro methane (CF<sub>4</sub>), a halide gas (Figs 1-6) by forming low pressure plasma. The system comprises: plungers instead of pumps to move the column of the gas plasma, a high frequency exciter (excitation unit), one unit of treating the reactive compounds (reaction removal unit). (Col 2, ln 45- 68, Col3, 4, 5, 6). No operating pressure is specified Breitbarth also teaches process and apparatus for disposing of

fluorocarbon containing compounds by conversion of these compounds in a low pressure plasma-chemical process in which the said compound are converted in the plasma with a solid with addition of oxygen, steam or hydrogen. The apparatus used is plasma reactor which contains the solid and can be operated with a high frequency, low frequency, direct current or microwave discharge".) With vacuum pumps and the operating pressure is from 0.1 mbar to 50mbar (equivalent to 37 torr)(Breitbarth, pag 2, para 9,10 of the translation, " *an apparatus is convenient, which becomes operated between two vacuum pumps. Via the pressure differential and the suction power of the pumps the conversion and the optimum reaction conditions can be steered*"). Both do not specify that the flow is viscous, however as the plasma is traveling in column form and steam is introduced as taught by Breitbarth and Rostaing points out that " *to increase the efficiency of the removal of the impurities, it is necessary that the flowing gas is put in contact with water so that this gas becomes laden with vapor*", which makes the flow viscous. (Col 11, ln 25). As both teach gas purification using plasma, It would have been obvious for one of ordinary skill in the art at the time of the invention to combine the teaching of Breitbarth of operating pressure of 37 torr and using vacuum pumps with teaching of Rostaing to improve the process of purifying perfluorinated gases by modifying the equipments to suit the needs and to achieve savings by minimizing equipment for an effective purification system for exhaust gas.

5. Regarding claims 2 and 9. Rostaing in view of Breithbarth specify an exhaust gas treatment method according to claims 1 and 8, wherein the exhaust gas is reacted with a reaction remover in the presence of oxygen. Rostaing (Col2, ln 32,

"Oxygen is added to the gas, prior to the step of making the gas flow through the dielectric tube"). It would have been obvious for one of ordinary skill in the art at the time of the invention to claim the addition of oxygen in the excitation unit (the dielectric tube) to make the unit compact and also where the oxygen is added is not important as long as it is added before introducing to the excitation unit.

6. Regarding claims 4 and 10. Rostaing in view of Breitbarth disclose an exhaust gas treatment method according to claim 1 and 8 wherein at least a portion of the exhaust gas is put into the excited state by plasma and /or ultraviolet light. ( Breitbarth, pg 1, para 6, "...With the help of a plasma-chemical process in interaction with a solid volatile and hydrolysable products..." and "the apparatus used is plasma reactor which contains the solid and can be operated with a high frequency, low frequency, direct current or microwave discharge"). Ultraviolet radiation device is a low frequency. Rostaing (col2, ln15," crating an electric field in the gas, an atmospheric-pressure plasma..").

7. Regarding claim 5. Rostaing discloses the exhaust gas contains xenon and/or krypton. (Col3, ln 64)

8. Regarding claims 6 and 11. Rostaing in view of Breitbarth disclose an exhaust gas treatment method according to claim 1 and 8 wherein calcium oxide and/or calcium hydroxide as reaction remover. (Breitbarth, pg 1, para. 10, "By introduction of alkali and/or alkaline –earth hydroxide or also oxides"). A well known reagent for decomposing fluorocarbons in the art that one of ordinary skill use for gas treatment.

9. Regarding claim 7. Rostaing in view of Breitbarth disclose an exhaust gas treatment method according to claim 1 wherein the harmful gas component is a hydride or halide of an element oxide of which is a solid.(Breitbarth, pg.1, para.1 "The inversion relates to a method to the disposal of fluorine-carbonaceous and other fluorohalide compounds, with which the fluorine compound is a solid") and Rostaing (col4, ln32-40)
1. Regarding claim 12. Rostaing in view of Breitbarth disclose an exhaust gas treatment method according to claim 1. They do not specify SV and LV value of the reactor. However, Breitbarth discloses that "depend on the gas throughput and the pressure as well as the electrical power current fed, SV and LV value will be optimized for equipment sizing". (page 2, para 13 of the translation). As SV and LV values are optimizing result-effective variables, they have no patentability weight. See MPEP 2144.05.

### ***Response to Arguments***

Applicant's arguments filed on June 26<sup>th</sup>, 2009 have been carefully considered but deemed not persuasive. The applicant's invention is " the exhaust gas is reacted with a reaction remover in the form of a viscous flow under a reduced pressure of 200 to 1 Torr. This key concept is clearly disclosed by Rostaing et al. (US5,993,612) in view of BreithBarth in DE4319118 as cited . Both teach to use a low pressure plasma at 0.01 - 50 mbar, equivalent to 37 Torr so the already excited exhaust gas in the form of a



viscous gas can react with a corresponding reactive element (reactive remover) for the purpose of removal of the impurities from the exhaust gas.

In respect to the argument that the Rostaing reference does not teach the gas to be partially excited. In the contrary, Rostaing clearly discloses in col2, ln 10-18, and ln 62-68 and in col3, ln 1-10, that the gas is forced flown with a plunger to the exciter .

Furthermore, Rostaing 's method is a plasma system which is not in local thermodynamic equilibrium or LTE which means that only the electrons present in the medium are raised to high energy, and the temperatures of the ionic and neutral species remaining much lower, which means that the gas is only "partially excited".

The argument is not persuasive. All the limitations of the claims are anticipated by Rostaing in view of Breithbath as stated.

### ***Conclusion***

Any inquiry concerning this communication or earlier communications from the examiner should be directed to COLETTE NGUYEN whose telephone number is (571)270-5831. The examiner can normally be reached on Monday-Thursday, 10:00-4:00 PM.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Curt Mayes can be reached on (571)-272-1234. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for

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Status information for unpublished applications is available through Private PAIR only.

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/COLETTE NGUYEN/  
Examiner, Art Unit 1793

August 10, 2009

/Melvin Curtis Mayes/  
Supervisory Patent Examiner, Art Unit 1793